

the Discovery Committee's programme in the southern hemisphere. R.R.S. *William Scoresby* was first to sea in January 1950 and proceeded to survey the Benguela Current off the coast of south-west Africa. It can be seen already that much information of first importance on the physics and chemistry of the current and on its faunistic content was obtained, and that the resources of the Institute will be strained to evaluate and publish the results in reasonable time. This ship also carried out fishing experiments in South African waters, some whale-marking and a considerable amount of work on the Agulhas Current before returning to England last autumn.

The larger R.R.S. *Discovery II* put to sea in May 1950 and proceeded to the southern hemisphere to undertake investigations on the lines of those between the Wars, but at seasons and in parts of Antarctic and Australasian waters previously least investigated. There was also a considerable number of other programmes for investigation. She is still at sea, but it is clear already that she will return prepared to add much to knowledge. The sea programme of the Discovery Committee will then have been completed. The working up of the vast faunistic collections must continue for many years. Similarly, the complete evaluation of the chemical and physical observations by the two ships at about four thousand stations during twenty years will require much effort.

The work on waves, swell, microseisms and currents initiated at the Admiralty Research Laboratory is being continued by the Institute. Although the main object of the wave research is to obtain quantitative information about the factors which influence the generation, propagation and decay of waves, such as will allow the wave conditions at any place to be predicted from wind charts and a knowledge of the local hydrography, the techniques which have been developed have immediate applications in places where meteorological information is not available. Such a possibility is being considered for Mauritius, where there is need of warning of the approach of a cyclone or heavy swell over the off-lying shoals used by local fishermen.

Modern oceanography demands larger ships, manned by officers and crew well versed in their specialized duties. The experience of the Discovery Committee, shared by the marine laboratories, is that it takes time to select and train such staffs and that it is a tragedy if key personnel have to be dispersed when a ship has to be laid up. But the larger ships have the capacity of collecting at a great rate. Even under the most favourable conditions, it will take a man ten weeks to work up observations which he can collect in one. Yet it would seem that the two vessels will have to be kept at sea and their collections and results appreciated, and the parallel laboratory investigations continued, by a staff of no more than sixteen scientific and six experimental officers. If these valuable, but expensive, ships are to be put to best use, a very considerable recruitment of staff would seem necessary.

In most fields of marine study the days of collecting for the sake of collecting are ended. The museums are stuffed with millions of specimens and station lists with hundreds of thousands of observations, woefully inadequate to give a true picture of the ocean it is true, but beyond the capacity of the systematists and physical oceanographers of Great Britain or, for that matter, of the world to work up. Support is more readily obtained for dispatching a spectacular expedition than for the quiet working up

of the results afterwards or for their publication. An adequate theoretical background and due selection of problems for work at sea is now possible and can lead to great economy. There is no doubt but that the National Institute of Oceanography under its present director will seek to achieve this.

Cost of publication everywhere presents a grave problem often met by the compression of papers to the point of incomprehensibility. In chemistry the high reproducibility of experimental results and standardization of techniques may make possible compression intelligible to the initiated, but not so in oceanography. In the sea the same situation never repeats itself and, the cost of getting observations being what it is, each one has to carry all the interpretation it can bear. The cost of the many necessary illustrations is now very high, and it seems less easy to get the relatively small funds for publication than for the prosecution of the actual research. May one hope that the Institute will be able to maintain the high standard of presentation of Discovery Reports?

Great Britain should be grateful that the creation of the National Institute of Oceanography has been courageously tackled and that investigations are proceeding on a wide front. It should get good value for the annual grant of £115,000 which departments of the home Government and certain Dominion Governments are providing. L. H. N. COOPER

## BRITISH INSTRUMENT INDUSTRIES EXHIBITION

THE Exhibition of the British Instrument Industries, which took place during July 4-14, in the National Hall, Olympia, London, owed its inception to a suggestion made by the Department of Scientific and Industrial Research. Some two years ago, the Department put forward the suggestion that it might be helpful and instructive to industry if an exhibition could be staged at which equipment, covering the entire range of industrial instrumentation, could be displayed and its use demonstrated. This suggestion was put before a meeting of interested trade associations who, while accepting the Department's recommendation, felt that the scope of the Exhibition should be extended to include the products of the whole field of British instrument manufacture, covering every variety of the use of instruments. This wider conception provided the background of the Exhibition which has recently concluded, and the successful achievement of these aims has been an event of unusual significance in the long history of instrument-making in Great Britain.

There has been a tendency for instrument interests to become sectionalized, according to the broad uses of various classes of instruments, and the five participating trade associations (British Electrical and Allied Manufacturers' Association; British Industrial Measuring and Control Apparatus Manufacturers' Association; British Lampblown Scientific Glassware Manufacturers' Association; Drawing Office Material Manufacturers' and Dealers' Association; and the Scientific Instrument Manufacturers Association of Great Britain, Ltd.) have emerged as representing groups of manufacturers of instruments having certain specific fields of use, although the last-named association, S.I.M.A., covers instrument

manufacture of great diversity. One reason for the special significance of the Exhibition is to be found in the fact that it involved a major co-operative effort on the part of these Associations, and demonstrated that the common ground of instrument manufacture is of sufficient extent both to permit co-operative effort and to render it highly desirable. The Exhibition has, therefore, served an excellent internal purpose, since it may well have checked a tendency for the total effort of instrument manufacture in Great Britain to be hampered by excessive emphasis being placed on sectional differences. There has, in the past, existed some confusion among the users of instruments in regard to methods of approach to the industry, and it is to be hoped that the common effort which has now been made may lead to a more unified system of access.

The Exhibition was also significant in its comprehensiveness. Previously, there have been displayed at various industrial exhibitions instruments peculiarly relevant to particular industries: a rather wider display of instruments has been staged at the British Industries' Fair; and in the very noteworthy exhibitions of the Physical Society the emphasis has been on instruments of immediate scientific interest. This most recent Exhibition of instruments, however, has given, for the first time, a complete picture of instrument manufacture in Great Britain, and has provided an opportunity of assessing the extent to which the extremely diverse and widespread requirements for instruments are being met by the range of products of the instrument industries. The display of instruments at Olympia gives solid grounds for the belief that instrument makers in Great Britain are, in general terms, adequately fulfilling their tasks, and that the diversity of requirements for instruments is being matched by an equal diversity and a commendable ingenuity of production.

Of the Exhibition itself it should be said that it was admirably staged. It was, naturally, a specialist exhibition, and it was not to be expected that the Hall would be thronged with people; one of the most pleasing features of the Exhibition was the genuine interest in instruments and their use which characterized almost every visitor. The area devoted to the exhibits was of an extent which allowed ample gangway space, and the lack of fatigue usually associated with a tour of an exhibition was quite exceptional. The organizing authorities are to be congratulated both on the general lay-out of the Exhibition and on the achievement of a very marked impression that this was indeed a display of very special products.

The diversity of instrument types is such that it would be impossible, and would serve no useful purpose, to give in any detail an account of the actual instruments which were displayed. A conspectus of modern instruments, such as that provided at Olympia, does emphasize the manner in which the use of instruments has been extended and entirely changed in emphasis during the past generation or two. It is not so long ago that Lord Kelvin devised electrical instruments specifically for use in the application of science rather than in the pursuit of fundamental knowledge. To-day, the majority of electrical instruments are designed to meet the requirements of the great electrical industry, and the need for precise electrical measurements in so many industrial and civil activities. Many visitors to the Exhibition must have remembered the time when such principles as those of thermo-electricity

and hydrodynamics were little known and little used outside the curricula of universities. The control of all industrial processes to-day is dependent upon the concrete application of these and other principles in the form of instrument devices. The provision of complicated scientific glassware was, at one time, only achieved through the skill of individual glass workers here and there, who served, almost entirely, individual laboratories. From the display at Olympia it is apparent that scientific glassware of the utmost intricacy can be obtained by routine ordering through the appropriate section of the industry. Much of the time of the research worker used to be taken up in improvisation and the devising of particular apparatus necessary to the prosecution of his investigations. To-day, instruments are available which will fulfil practically every research need, and the days of almost complete dependence upon the laboratory workshop are largely a memory. In an entirely different field, the set-square, ruler and dividers have been supplemented by a whole series of drawing-office devices, and both the preparation and reproduction of drawings and blueprints have been revolutionized. It is realized to-day that full productivity is dependent upon the provision of the tools most appropriate to each field of endeavour, and it is equally apparent that effective activities in science, whether they be in the acquisition of new knowledge or in the application of knowledge to utilitarian purposes, require that there shall be available the requisite and appropriate instrumental aids. The Exhibition at Olympia has demonstrated that the range of such aids emanating from British instrument industries is most satisfactory in its comprehensiveness.

It must be obvious to any observer with an intimate knowledge of industry that the proportion of effort covered by research and development in the production of scientific instruments is abnormally high. There is frequently heard a complaint that a particular type of instrument with certain peculiar features is not available from any British manufacturer, whereas it can be obtained from some other country. It is, of course, equally true that in other countries the complaint is made that particular types of instrument with peculiar characteristics can only be obtained from Great Britain. While, superficially, it might appear to be desirable that every conceivable instrument or device should be produced by the instrument makers in Great Britain, yet it should be remembered that instrument-making is no more free from economic considerations than is any other industrial undertaking. There is much to be said for the view that it would, in fact, be a retrograde step if the instrument makers of every country attempted to produce every variety of instrument which can possibly be required by the scientific workers of that country, irrespective of considerations of the total universal demand for any one type. It is apparent that the instrument industries of Great Britain have attempted to meet, as completely as possible, the general requirements for instruments. Too often the magnitude of the achievement of the instrument maker is minimized through a sense of irritation caused by an inability to obtain from any maker an instrument exactly suited to a small but specialist use. It is very doubtful whether an extensive range of instruments, such as has been shown at Olympia, could have been made available had the instrument industries not been compelled, by economic necessity, to maintain a sense of proportion in their manufacture.